

To LP or Not LP

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The Case

A 4-month-old male infant was seen in the office setting of a large multisite practice. He presented with fever and irritability without an obvious source. He was referred to the local pediatric emergency department for further evaluation. Parents were advised the reason for the referral was so that he could get a "blood test" performed.

Because the clinic was busy, the provider was unable to call the emergency department (ED) physician in a timely manner. The parents presented to the ED and said they were there for a "blood test" and were referred to a local lab for further evaluation. At the lab, they were informed that the doctor had not called in any lab test orders. The lab asked the patient's family to wait while the physician was called, but while waiting the infant became more obtunded and toxic. At that point, the parents decided to leave and go to another hospital ED for evaluation. Meanwhile, the original physician called the first ED for the lumbar puncture (LP) results. He was informed that the patient had been sent to the lab and was not seen in the ED. At the second ED, an LP was done after another physician evaluation, and the child was diagnosed with meningitis. Despite the several-hour delay, the child was treated with 10 days of medication and recovered fully.

The Commentary

This case highlights an important problem in pediatrics, the evaluation of the febrile infant, as well as two problems common across medical disciplines: diagnostic delay and failures of communication. Fortunately, no long-term sequelae occurred as a consequence of the errors in care suffered by this patient, but the outcome could have been tragic.

Management of the febrile infant without obvious source has been a subject of intense study over the past decade. The high incidence of severe, invasive bacterial illness among very young febrile infants without identifiable source has led to the development of well-substantiated practice guidelines regarding their management. Current recommendations are that all febrile children younger than 1 month of age should have samples of cerebrospinal fluid (CSF), blood, and urine taken to rule out the presence of bacterial

infection (1) and should be treated with parenteral antibiotics. For well-appearing children who are slightly older (1 to 36 months of age), there is considerably more debate about the optimal course of action (2-4), but the broad consensus is that an ill-appearing child should be thoroughly evaluated and treated expectantly while awaiting cultures. In this case involving a 4-month-old, unexplained irritability with fever would merit a lumbar puncture and intravenous (IV) antibiotic therapy, particularly if the irritability were severe or prolonged.

The provider's referral of this patient to the local ED, and follow-up call to learn the results of the lumbar puncture indicate that he was appropriately concerned about the possibility of meningitis or other occult infection. The plan to refer the patient was sound, but the provider made errors in executing this plan, which facilitated a cascade of additional downstream errors. Four distinct errors occurred in this case. First, the provider failed to directly contact the ED and convey his concerns. Second, there was an undefined breakdown in communication between the provider and the patient's family, which led them to not completely understand the reason for their visit to the ED. Ideally, the provider should have ensured the patient's family had more accurate information before sending them out of the office. Third, in part because the ED did not receive important information directly from the referring provider, the ED failed to obtain an adequate history from the patient's family before sending him to the lab. Fourth, as a consequence of the confusion generated by errors one through three, there was an avoidable delay at the laboratory, during which time the patient deteriorated and required a visit to a second ED.

It is easy to identify erroneous actions in this scenario, but one should recognize that these errors did not occur in a vacuum. The errors in execution made by the original provider likely would not have occurred in less hectic working conditions. The ED and laboratory could have been more proactive about clarifying information, but had errors one and two not occurred, they would almost certainly not have been in positions to make errors of their own. In other words, both "active" errors (on the part of individuals) and "latent" errors (deeper problems in how the systems operated) conspired to cause a problem for this patient: a delay in diagnosis. Indeed, most adverse events suffered in medicine are the consequence of multiple small failures such as these, each of which may be independently insufficient to cause harm.(5)

As Leape points out, cognitive psychologists have long known that errors in the completion of routine tasks are particularly likely to happen when one is working under suboptimal conditions.(6) Sleep deprivation, distractions, emotional pre-occupations, or as is cited in this case, overwork, all predispose us to error. In a busy clinic, where overwork and distractions are the norm, such errors will inevitably occur from time to time.

It is interesting to note that all four of the errors in this scenario involved breakdowns in communication. The first two errors involved the provider's failure to communicate with the ED and patient's family respectively. The combination of these failures left the family inappropriately responsible for conveying crucial clinical information they did not adequately understand. The third error was due to a failure of the ED to adequately question the family's reason for arrival at the ED, which was made far more likely as a consequence of the first two errors. The fourth error was a communication delay.

In a study of medication errors in an adult hospital, investigators at Brigham and Women's Hospital found that cross-coverage of unfamiliar patients was associated with a roughly 6-fold increase in the incidence of

medication errors (7), suggesting that knowledge deficits and inadequate communication about patients led to increased error rates. Interestingly, in a second study, the same investigators found that this increased risk of error virtually disappeared following the introduction of a structured, computerized sign-out tool used by housestaff to exchange critical patient care information.(8) In a study of strategies to prevent pediatric medication errors, it was found that optimal communication could have prevented 86% of all errors detected.(9) Communication problems are crucial sources of error across medical systems. Hospitals and health care systems that successfully improve communication will unquestionably reduce errors not only in medication delivery, but in diagnosis and the performance of complex procedures.

The end product of the series of latent errors, errors in execution, and communication breakdowns in this case was a delay in diagnosis and management of a very time-sensitive illness, meningitis. In the Harvard Medical Practice Study, diagnostic mishaps were the fourth most common type of error, and the category of error most likely to be deemed negligent.(10) While a delay in diagnosis of hours would be trivial for many illnesses, it could be fatal in the case of a rapidly invasive bacterial illness. Meningococcus in particular, one of the more common causes of bacterial meningitis in children, can cause a rapidly progressive illness that is more likely to be fatal if not diagnosed and treated promptly.(11)

Take-Home Points

Many of the issues discussed above are complex, and will improve only as automated systems of communication develop, as working conditions improve, and as the culture of medicine gradually becomes more safety-conscious. There are, however, a few simple steps that if followed routinely, would have prevented this particular scenario from unfolding:

- Health care providers should establish a system to provide patients with a written description of the reason for referral when sending them emergently to an ED.
- Furthermore, providers should establish a system to ensure that a receiving provider in the ED is spoken with directly. In settings where providers cannot realistically accomplish this goal themselves 100% of the time, a system should be established that assures this step is completed (eg, designating a nurse to make direct contact with the ED in all such cases).
- Designated ED staff (perhaps triage nurses) should confirm the reason for referral of all patients sent from another health care provider whenever it is unclear.

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